

14 May 1991

VO8FN-C

VOLTMETER, PHASE ANGLE

1. GENERAL. This procurement requires a general purpose, self-contained, phase-sensitive voltmeter.

2. CLASSIFICATION. Type II, Class 5, Style E, and Color R in accordance with MIL-T-28800 for shipboard applications.

3. OPERATIONAL REQUIREMENTS. The equipment shall be capable of measuring the true phase angle between two alternating voltages, the absolute fundamental amplitude, and the in-phase and quadrature phase amplitudes of alternating voltages. The equipment shall also function as a conventional voltmeter.

3.1 Frequency ranges. 380 to 420 Hz for measurement of phase angle, fundamental voltage, in-phase voltage, and quadrature voltage. 10 Hz to 100 kHz as a conventional voltmeter.

3.2 Phase angle range. 0° to 360°.

3.3 Voltage ranges. 0.3 mV to 300V full scale.

3.4 Phase angle accuracy. $\pm 1.0^\circ$.

3.5 Voltage accuracy. $\pm 2\%$ of full scale from 380 to 420 Hz. The accuracy of conventional voltage measurements shall be within those values specified in table I.

TABLE I. Voltage Accuracy.

| <u>Frequency Range</u> | <u>Accuracy (% of full scale)</u> |
|------------------------|-----------------------------------|
| 10 Hz to 20 Hz | ± 5 |
| 20 Hz to 50 kHz | ± 2 |
| 50 kHz to 100 kHz | ± 5 |

3.6 Input requirements. The signal input channel shall be switchable for isolated (transformer coupled) or direct coupling.

3.6.1 Reference input impedance. 300 kilohms minimum at 400 Hz and 100 kilohms minimum below 400 Hz.

3.6.2 Signal input impedance. 300 kilohms at 400 Hz in the isolation transformer mode and 10 megohms minimum shunted by 75 pF in the direct mode.

3.6.3 Reference input level. 1.5 to 200 Vac 380 to 420 Hz.

3.6.4 Signal input levels. 0 to 300 Vac.

3.6.5 Maximum signal input levels. Direct mode: 300 Vac + 400 Vdc. Isolated mode: 1 Vdc + (300 Vac or 0.75 times the input frequency).

3.6.6 Harmonic rejection. Both the reference input channel and the signal input channel shall be provided with the following rejection of harmonics in the transformer-coupled mode:

- a. Phase-sensitive modes: 55 dB minimum from 380 to 420 Hz.
- b. Fundamental mode: 20 dB minimum from 380 to 420 Hz.

3.7 Displays.

3.7.1 Phase angle display. Resolution: 0.2°.

3.7.2 Voltage display. Resolution: $\pm 0.2\%$ of full scale.

4. GENERAL REQUIREMENTS.

4.1 Power source. MIL-T-28800 nominal power source requirements are invoked. Operation at 400 Hz is not required. Maximum power consumption: 15W.

4.2 Weight. 20 kg (44 lb) maximum.

4.3 Lithium batteries. Per MIL-T-28800, lithium batteries are prohibited without prior authorization. A request for approval for the use of lithium batteries, including those encapsulated in integrated circuits, shall be submitted to the procuring activity at the time of submission of proposals. Approval shall apply only to the specific model proposed.